APPENDIX E

The following page contains the project Mack submits to satisfy its obligation under paragraph 84 of this Consent Decree. Project 1A is intended to satisfy the 55% federal requirement.

MACK ENVIRONMENTAL PROJECT
EMISSIONS TECHNOLOGY DESCRIPTION SHEET

PROJECT NUMBER:	IA	PROJECT NAME:	Ultra-low In-cylinder Emissions Engine - Part A

PROJECT DESCRIPTION

Expected Emissions Effect:

The intent of this project is to develop technologies capable of reducing the formation of controlled emissions and greenhouse gases in-cylinder, especially to improve the NOx / BSFC relationship without the need for aftertreatment systems. The goal is to recover as much fuel efficiency as possible while approaching 1.0 g/bhp-hr NOx and .05 g/bhp-hr particulate levels, through the synergistic optimization of combustion cylinder configuration, breathing system, and fuel injection equipment. These projects anticipate use of conventional diesel fuels. Given the challenges of these low emissions targets, advanced EGR and exhaust treatment will likely be applied to these in-cylinder technologies to achieve both the lowest emission possible and to evaluate real world deployment feasibility.

Technical Solution:

The study will be directed in 2 phases as follows:

Phase 1: Advanced rate shaping, including full range rate and pressure control, and multiple injection capability on the EUP platform, and fuel / water / fuel injection.

Phase 2: Develop and evaluate fuel system capable of ultra high peak pressure (up to 3000 bar) , including adjustment of plunger diameter, cam velocity, and nozzle flow area. This is expected to require further optimization of combustion geometry, swirl/flow characteristics, and rate shaping features, and an evaluation of fuel effects.

Both phases will be evaluated with and without EGR and exhaust gas treatment.

NOTE: No expenses are included in this project for development of EGR or exhaust gas treatment technology.

Investigation Methods:

Fuel system capability development would be carried out through cooperative efforts with FIE suppliers as directed by engineering consultants. Prototype systems would be evaluated on test stand prior to evaluation on an engine test cell. Breathing systems would be developed via CFD and engine simulation software, then prototypes would be generated for test cell evaluation and further optimization. At appropriate times during these studies, vehicle testing would be conducted to evaluate in-situ performance characteristics.

Other Information:

COST OF PROJECT

	TOTAL COST OF PROJECT FROM PROJECT START TO PROOF OF FEASIBILITY:	6.05	M$

LENGTH OF PROJECT

	TOTAL NUMBER OF MONTHS FROM PROJECT START TO PROOF OF FEASIBILITY:	48	

DATE:	7 Oct 98		ENG. INITIALS	SCB